

EE 327 Signals and Systems 1
Homework 9

1. Find the z Transform of the following signals.

a. $x[n] = \delta[n] + 7\delta[n-2] - 9\delta[n-3]$

b. $x[n] = \left(\frac{1}{4}\right)^{n-2} u[n-2]$

c. $x[n] = \left(\frac{1}{4}\right)^n (u[n-2] - u[n-5])$

d. $x[n] = nv[n]$ where $v[n] = \left(\frac{1}{2}\right)^n u[n] + \left(-\frac{1}{2}\right)^n u[n]$

2. Find the inverse z Transform of the following signals.

a. $X(z) = 5(1 - z^{-1})(1 + z^{-1})(1 + 10z^{-1})$

b. $X(z) = \frac{1}{\left(1 - \frac{1}{2}z^{-1}\right)(1 - z^{-1})}$

c. $X(z) = \frac{3z^2 + 1}{\left(z - \frac{1}{4}\right)^2}$

d. $X(z) = \frac{z}{z^2 + 4z + 8}$

3. Find the transfer function of the following difference equations.

a. $y[n] + 0.5y[n-1] = 2x[n]$

b. $y[n] + 2y[n-2] = 2x[n] - x[n-1]$

4. Find the final value of the following discrete-time signals.

a. $X(z) = \frac{(z-1)(z+0.2)}{(z-0.3)(z+0.4)}$

b. $X(z) = \frac{z^3 + z + 1}{(z^2 - 0.25z + 0.1)(z-1)}$